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NINE MILE POINT
NUCLEAR STATION

November 5, 2013

U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

ATTENTION: Document Control Desk

SUBJECT: Nine Mile Point Nuclear Station Unit 1
Renewed Facility Operating License No. DPR-63
Docket No. 50-220

Revision 1 to Licensee Event Report 2012-002, Automatic Reactor Scram due to Automatic Generator Protective Trip

Licensee Event Report (LER) 2012-002, Automatic Reactor Scram due to Automatic Generator Protective Trip, was submitted on November 19, 2012 in accordance with 10 CFR 50.73(a)(2)(iv)(A). Attached is Revision 1 to LER 2012-002. This supplement is submitted to update the root cause of the event, associated actions and failed components.

There are no regulatory commitments in this submittal.

Should you have questions regarding the information in this submittal, please contact Everett (Chip) Perkins, Director-Licensing, at (315) 349-5219.

Sincerely,

JJS/KJK

Attachment: Revision 1 to Licensee Event Report 2012-002, Automatic Reactor Scram due to Automatic Generator Protective Trip

cc: Regional Administrator, NRC
Project Manager, NRC
Resident Inspector, NRC

IE22
NRR

ATTACHMENT

REVISION 1 TO LICENSEE EVENT REPORT 2012-002

AUTOMATIC REACTOR SCRAM DUE TO AUTOMATIC GENERATOR PROTECTIVE TRIP

Nine Mile Point Nuclear Station, LLC
November 5, 2013

NRC FORM 366 (10-2010) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 10/31/2013

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA/Privacy Section (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

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4. TITLE

Automatic Reactor Scram due to Automatic Generator Protective Trip

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
									NA	NA
09	20	2012	2012	002	1	11	05	2013	FACILITY NAME: NA	DOCKET NUMBER: NA

9. OPERATING MODE

N

10. POWER LEVEL

100

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: *(Check all that apply)*

☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☒ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ OTHER
☐ 20.2203(a)(2)(vi)	☐ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER (Include Area Code)
Everett (Chip) Perkins, Director - Licensing	(315) 349-5219

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
X	TB	CAP	G080	Y	X	TB	EC*	G080	Y

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR
NA	NA	NA

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

On September 20, 2012, at 0923, Nine Mile Point Unit 1 (NMP1) experienced an automatic reactor scram due to an automatic generator protective trip. The NMP1 main generator excitation controls failed to maintain reactive load below the trip setpoint when transferred from automatic regulation to manual regulation. Following the reactor scram, the High Pressure Coolant Injection system automatically initiated on low Reactor Pressure Vessel (RPV) water level as designed.

One root cause of this event is that in 2003, a failure to follow the existing administrative procedure guidance for procedure change evaluations resulted in an inadequate review of the procedure change and introduction of a latent error into the amplidyne operating procedure. Additionally, the single point vulnerability life cycle management (LCM) strategy for this system was not developed or implemented in a timely manner and did not address the increased risk from aging electronic/electrical components.

Corrective actions include replacing degraded electronic components of the automatic voltage regulator, revising LCM strategies and procedure revisions for amplidyne operation.

This event is reportable in accordance with 10 CFR 50.73 (a)(2)(iv)(A) as a valid actuation of the reactor protection system and initiation of the high pressure coolant injection system.

There are no previous LERs for similar failures.

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NARRATIVE

I. DESCRIPTION OF EVENT

A. PRE-EVENT PLANT CONDITIONS:

Prior to this event, Nine Mile Point Unit 1 (NMP1) was operating and stable at 100 percent power with no inoperable systems affecting this event.

B. EVENT:

On September 20, 2012, at 0923, Nine Mile Point Unit 1 (NMP1) experienced an automatic reactor scram due to an automatic generator protective trip. The NMP1 main generator excitation controls failed to maintain reactive load below the trip setpoint when transferred from automatic regulation to manual regulation. The NMP1 automatic voltage regulator (AVR) is designed to automatically regulate main generator terminal voltage. An amplidyne motor generator is used as the output stage of the regulator and controls exciter voltage, which in turns controls main generator terminal voltage. If the main generator load changes, the resultant change in terminal voltage will cause the automatic regulator to produce an amplidyne control signal to raise or lower (boost or buck, respectively) the main generator exciter field voltage.

The transfer from automatic to manual voltage regulation was being performed due to oscillations on the AVR causing the buck/boost meter to fluctuate. An attempt to null the AVR was made, but was unsuccessful due to the oscillations. When placed in manual regulation, the magnitude of reactive loading taken in to the generator was great enough to activate the loss of excitation protective relaying. A reactor scram resulted from the generator trip because turbine load was above the 45% scram bypass setpoint.

Following the automatic reactor scram, the High Pressure Coolant Injection (HPCI) system automatically initiated on low Reactor Pressure Vessel (RPV) water level as designed. At 0924, RPV water level was restored above the HPCI low level actuation set point, the HPCI initiation signal was reset, and the HPCI system was secured. After the reactor scram and turbine trip, the turbine bypass valves operated properly to control reactor pressure. All control rods fully inserted and all systems functioned as expected.

The HPCI system actuation signal on low RPV level is an expected occurrence following a reactor scram due to water level shrinkage. The HPCI system is an operational mode of the feedwater system and is not an Emergency Core Cooling System (ECCS).

There was no impact on Nine Mile Point Unit 2 (NMP2) from this event.

This event involved the automatic actuation of the Reactor Protection System (RPS), which resulted in a reactor scram, and the automatic initiation of the HPCI system due to reactor low water level. The notification per 10 CFR 50.72(b)(2)(iv)(B) for RPS actuation and 10 CFR 50.72 (b)(3)(iv)(A) for HPCI initiation were completed on September 20, 2012 at 1155 (Event Number 48323).

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NARRATIVE

C. INOPERABLE STRUCTURES, COMPONENTS, OR SYSTEMS THAT CONTRIBUTED TO THE EVENT:

There were no inoperable components or systems that contributed to this event.

D. DATES AND APPROXIMATE TIMES OF MAJOR OCCURRENCES

All times below are approximate and occurred on 9/20/2012;

0922 - The operator observes oscillations on the AVR causing the buck/boost meter to fluctuate. The operator attempts to null the AVR, but was unsuccessful due to the oscillations.

0923 - The AVR is removed from service, the generator trips and the reactor scrams.

0923 - HPCI mode of operation initiates on low reactor water level.

0924 - Reactor water level is restored above the low water level set point and HPCI system secured.

E. OTHER SYSTEMS OR SECONDARY FUNCTIONS AFFECTED:

None

F. METHOD OF DISCOVERY:

This event was discovered by the operators when the annunciators for generator trip and RPS initiation of the reactor scram alarmed in the control room.

G. MAJOR OPERATOR ACTION:

On September 20, 2012, at 0922, the operator observed oscillations on the AVR causing the buck/boost meter to fluctuate. The operator attempted to null the AVR, but was unsuccessful due to the oscillations.

After the scram, the operators verified all rods fully inserted. No other actions were required to support shutting down the reactor.

H. SAFETY SYSTEM RESPONSES:

All safety systems responded per design. There was no loss of offsite power to the onsite emergency buses, the HPCI system initiated as designed, and the ECCS systems were available, but not called upon to support the safe shutdown of the reactor.

II. CAUSE OF THE EVENT:

There were two root causes of this event. One root cause of this event is that in 2003, a failure to follow the existing administrative procedure guidance for procedure change evaluations resulted in an

inadequate review of the procedure change and introduction of a latent error into the amplidyne operating procedure. The Design Engineering organization was not afforded a cross disciplinary review of the procedure to ensure the change in operating strategy was aligned with the design standards for the system. The procedure change had been implemented in an attempt to increase current flow through the amplidyne commutator brushes to reduce wear. The impact of operating with a 10-20 volt boost amplidyne output was not fully understood by personnel making the change. The procedure change did not address how voltage regulation would be affected when operating with a 10-20 volt boost prior to automatically or manually transferring to manual voltage regulation without nulling the amplidyne output.

The second root cause is that a single point vulnerability life cycle management strategy for the NMP1 AVR was not developed or implemented in a timely manner and did not adequately address the increased risk from aging electronic/electrical components. In 2009, a change to the course of action for addressing the grooving on the Amplidyne commutator was made from trying to solve the cause of the grooving to managing the condition until the excitation control system could be replaced and the Amplidyne motor generator eliminated. This course of action had the benefit of eliminating an aging and obsolete system from the plant. This system had been essentially maintenance free since the plant had entered the operating phase. What was not done at this time, or previously, was to perform a review of the excitation control system at the component level to determine what other components should be considered for preventive maintenance activities or component replacements. This would have been a prudent action to make sure that the existing excitation control system would operate properly until it is replaced.

The contributing cause is less than adequate problem resolution for a recurring intermittent issue due to lack of understanding of the AVR control circuitry which prevented identifying the aggregate failure mechanism. Lack of Voltage regulation system expertise resulted in failure analysis (FMEAs) and troubleshooting which were too narrowly focused to identify all the degraded conditions that could explain observed symptoms. The failure to fully consider and evaluate potential impacts from degraded inputs to the AVR resulted in repeat oscillations/spiking occurrences. Failure analysis results were not sufficiently challenged due to lack of expertise.

The NMP2 generator control system uses an Alterrex Excitation System which contains an Auto-tracking section that maintains the Manual Voltage Regulator within 2 volts of the Automatic Voltage Regulator; thus, NMP2 is not susceptible to the type of failure that occurred at NMP1.

This event was entered into the Nine Mile Point Nuclear Station (NMPNS) corrective action program (CR-2012-008673).

III. ANALYSIS OF THE EVENT:

This event is reportable in accordance with 10 CFR 50.73 (a)(2)(iv)(A), as an event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph 10 CFR 50.73 (a)(2)(iv)(B). Both the RPS and HPCI system (an operating mode of the feedwater system) were actuated during this event. Both systems are listed in 10 CFR 50.73 (a)(2)(iv)(B).

Except for the failure of the AVR, there were no equipment failures associated with this event. All other plant systems performed per design. Plant parameters, other than the reactor water level,

remained within normal values throughout the event. There was no loss of offsite power to the onsite emergency buses, HPCI initiated as designed, and the ECCS systems were available, but not called upon to support the safe shutdown of the reactor.

Had a design basis accident occurred coincident with this event, plant systems would have responded per design to mitigate the accident. Based on the above considerations, the safety significance of this event is very low, and the event did not pose a threat to the health and safety of the public or plant personnel.

This event affects the NRC Regulatory Oversight Process (ROP) Index for Unplanned Scrams. Due to this scram, the Unplanned Scrams Index value will be 1.6 compared to the Green-to-White threshold value of greater than 3. This reduction will not result in entry into the "Increased Regulatory (White) Response Band."

IV. CORRECTIVE ACTIONS:

A. ACTION TAKEN TO RETURN AFFECTED SYSTEMS TO PRE-EVENT NORMAL STATUS:

1. The degraded sub-components of the AVR were replaced. The plant was returned to full power on September 26, 2012. The voltage regulator was operated in manual and performance monitored, prior to returning the AVR to service.

B. ACTION TAKEN OR PLANNED TO PREVENT RECURRENCE:

1. The operating procedure was revised to operate the amplidyne at null (zero volts) position.

2. The NMP1 AVR is scheduled for replacement in the NMP1 2015 refueling outage.

3. Review/develop and gain Plant Health Committee approval of the new/revised life-cycle management strategies for the single point vulnerable components in the NMP1 Turbine Generator system.

4. Revise the troubleshooting procedure to require a specific challenge of the proposed resolution to issues that are intermittent and recurring in nature. The intent of the challenge is to ensure the FMEA (or other causal tool) has sufficient support/refute data to ensure all potential causes have been adequately addressed.

V. ADDITIONAL INFORMATION:

A. FAILED COMPONENTS:

Sub-components in the AVR control circuit found degraded:

- capacitor on the AVR card
- potentiometers A3P and A2P
- 90R control switch
- Potential Transformer (PT)

NARRATIVE

- PT Fuses

B. PREVIOUS LERs ON SIMILAR EVENTS:

None

C. THE ENERGY INDUSTRY IDENTIFICATION SYSTEM (EIIS) COMPONENT FUNCTION IDENTIFIER AND SYSTEM NAME OF EACH COMPONENT OR SYSTEM REFERRED TO IN THIS LER:

COMPONENT	IEEE 803 COMPONENT IDENTIFIER	IEEE 805 SYSTEM IDENTIFICATION
Capacitor on AVR card	CAP	TB
Potential Transformer	XPT	TB
Potential Transformer Fuses	FU	TB
Voltage Regulator	EC*	TB
Main Generator Exciter	EXC	TB
Main Generator System	N/A	TB
Main Generator Output Power System	N/A	EL
High Pressure Coolant Injection System	N/A	BJ
Reactor Protection System	N/A	JC

D. SPECIAL COMMENTS:

None